

Remote Controls

ENCODER / DECODER
COMPONENTS & SYSTEMS
TO COMMAND,
SELECT, INDICATE,
AND REGULATE



BRAMCO CONTROLS DIVISION, LEDEX INC.

College and South Streets, Piqua, Ohio 45356 • Phone 513-773-8271



SINGLE CHANNEL

Audio Tone Encoding

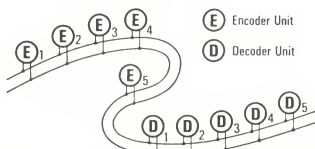
ENCODER COMPONENTS
AND SYSTEMS
TO COMMAND,
SELECT, INDICATE,
AND REGULATE



BRAMCO CONTROLS DIVISION, LEDEX INC., PIQUA, OHIO

audio tone encoding

An audio tone can be generated by an electronic oscillator or resonant reed encoder circuit, then transmitted by wire or radio. The tone activates a resonant reed relay to perform a control function that selects, indicates, or regulates.



A single pair of wires, or a leased telephone line, can carry the audio signals for a complete control system.



For inaccessible areas or mobile installations, a radio transmitter and receiver system can carry the signals.

Bramco* resonant reed encoders are precision electromechanical devices designed for use as the frequency determining components in audio oscillator circuits.

Accurately tuned and processed, the reed is free to vibrate as a single tine of a tuning fork. It is biased by an alnico permanent magnet. As it vibrates, the reed motion induces an impedance change in the coil at the tuned frequency. This impedance change regulates the frequency of the oscillator circuit.

Bramco encoder reeds are engineered for high accuracy. This feature, combined with the narrow response bandwidth of Bramco decoder reeds, permits over 50 selective control frequencies within the 67 to 1600 cps spectrum.

A big advantage of reeds in control switching is that they are ideally suited for simultaneous and sequential coded tone systems. The actual number of control functions possible in such a system is virtually unlimited. For example, over 3300 individual control functions are possible with only 16 frequencies coded sequentially in groups of three.

Bramco resonant reed encoders, compared to other types of audio tone oscillators, offer these main benefits: frequency accuracy, temperature and voltage stability, and simplified frequency changing in the field.

RE1: The RE1, with a broad frequency spectrum of 300 to 1600 cps, is a universal single channel encoder for any remote control system that must deliver reliable performance under tough operating conditions. A floating type internal shock mount assures high stability under mobile conditions—makes it ideal for two way selective call systems in mobile communications and industrial supervisory controls.

RE10: Comparable to the RE1 in construction and performance, the RE10 extends the frequency spectrum to the lower 67 to 300 cps range. If you're concerned about command signals interfering with normal voice communications, a sub-audible selective call system designed around the RE10's low frequency spectrum provides an ideal solution.

ME1C: Plug it in. Add power. This compact encoder module is ready to go to work as delivered. One (or several) ME1C modules comprise the entire encoding portion of your control system.

The transistorized ME1C plug-in encoder is a complete oscillator circuit with a built-in resonant reed stabilizer. Requiring only a DC voltage input, it provides a continuous running fixed audio sine wave output. The output is keyed to give immediate response when a signal is desired.

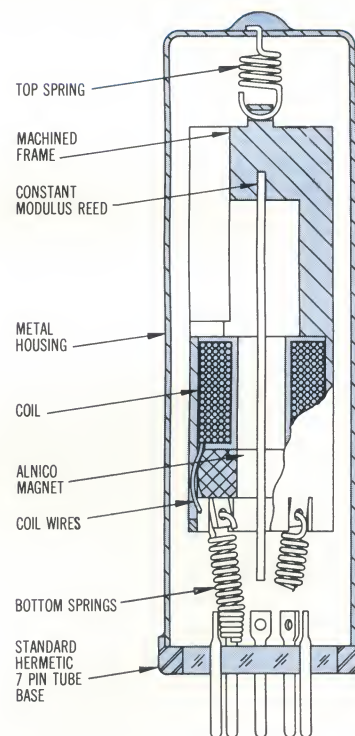
The single channel modular concept offers flexibility, allowing the addition of as many frequencies as required for a particular system. Each module, when individually keyed, provides one control function. For multiple control functions, more than 50 separate frequencies within the 67 to 1600 cps range can be provided for use in one system.

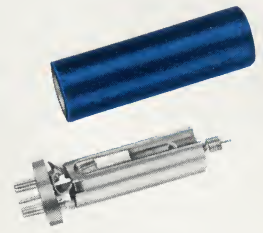
The all-transistorized circuitry is mounted on a rugged glass-epoxy printed circuit board. An internal adjustment control allows the output level to be set from 0 to maximum. The frequency of each module can be conveniently changed by replacing the plug-in resonant reed stabilizer.

A complete high stability oscillator network, the ME1C serves as an economical and dependable encoder for any of Bramco's resonant reed decoder products.

Companion decoder modules and plug-in power supplies are also available.

RE1





| | |
|--------------------------------|--|
| standard specifications | RE1 resonant reed oscillator stabilizer |
|--------------------------------|--|

| | |
|----------------------------|---|
| frequency range | 300 to 1600 cps |
| frequency tuning tolerance | $\pm .1\%$ * |
| frequency stability | varies less than .002% per °C (25°C REF.) |
| temperature range | -40°C to +85°C |
| coil resistance | 600 ohms dc $\pm 10\%$ |
| output impedance | depends on circuit used |
| output | sine wave: amplitude and frequency d |
| harmonic distortion | depends on circuit used |
| power required | |

*STANDARD ENCODERS are tuned to provide the

AUDIO TONE CONTROL SYSTEM
USING RE1 OR RE10 ENCODERS

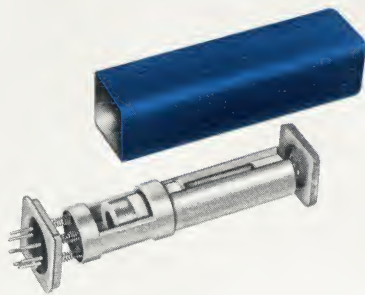
E = encoders, 5 frequencies

T = transmission line: RF carrier
or 2 wire loop

D = decoders, 5 frequencies

F = controlled functions

NOTE: Function 4 illustrates the
use of two simultaneous or se-
quential tones to code a single
function.



RE10 resonant reed oscillator stabilizer

67 to 300 cps

$\pm .1\%$ or $\pm .1$ cps (whichever is greater)*

varies less than .002% per $^{\circ}\text{C}$ (25°C REF.)

-40°C to $+85^{\circ}\text{C}$

600 ohms dc $\pm 10\%$

depends on circuit used

depending on circuit used

depends on circuit used

.....



ME1C resonant reed encoder module

67 to 1600 cps

$\pm .15\%$

varies less than .002% per $^{\circ}\text{C}$ (25°C REF.)

-40°C to $+85^{\circ}\text{C}$

.....

10K ohms

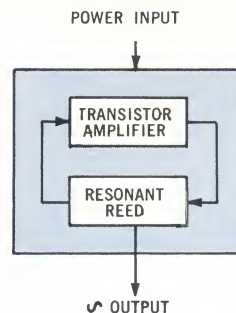
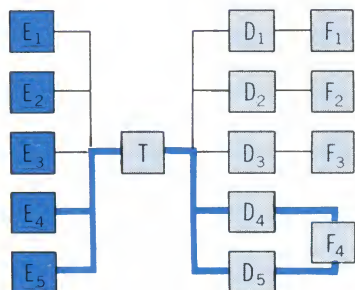
sine wave adjustable to 2 VRMS into 10K load

less than 5%

10 ma at 24 vdc

*specified frequency in the encoder circuits shown (Fig. D).

ME1C FUNCTIONAL BLOCK DIAGRAM



dimensional data

base diagrams

FIG. A

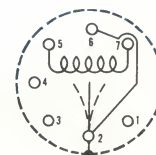
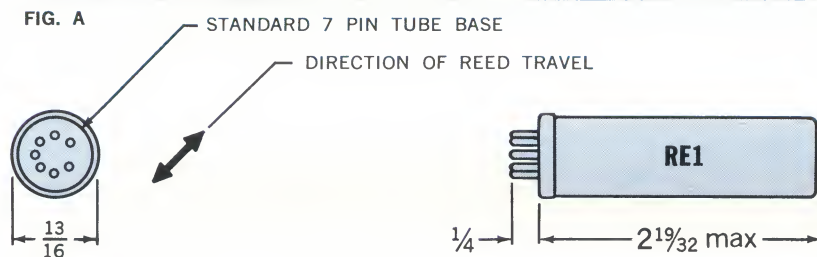


FIG. B

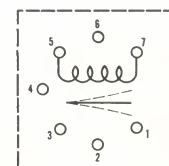
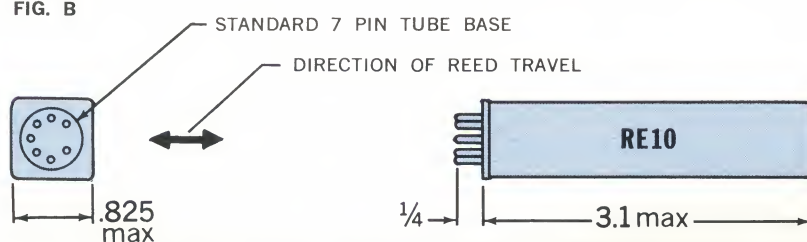
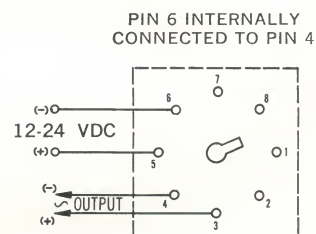
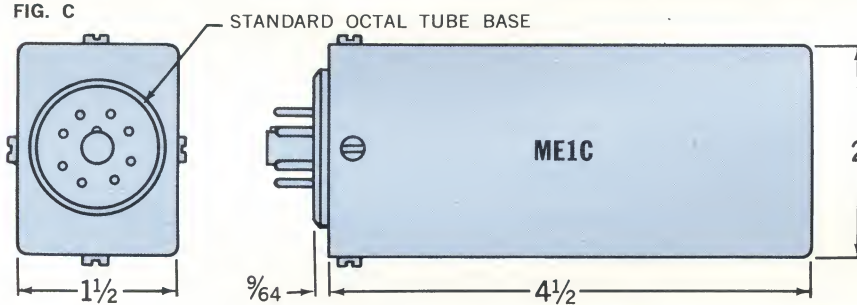


FIG. C



recommended encoder circuitry

Standard RE1 and RE10 encoders are tuned to provide the specified frequency in the encoder circuit (Figure D). The feedback adjustment in the oscillator circuit is provided to set the circuit gain slightly above the oscillator threshold. While not a critical adjustment, excessive feedback will result in output distortion.

Buildup time will vary from .1 to 60 seconds, depending upon frequency and feedback setting. This delay time should be considered when designing your system. The circuit will not free-run when the reed unit is disconnected.

It is recommended that the oscillator run continuously and be keyed to the amplifier to give immediate response when a signal is desired.

FIG. D. RECOMMENDED ENCODER CIRCUIT

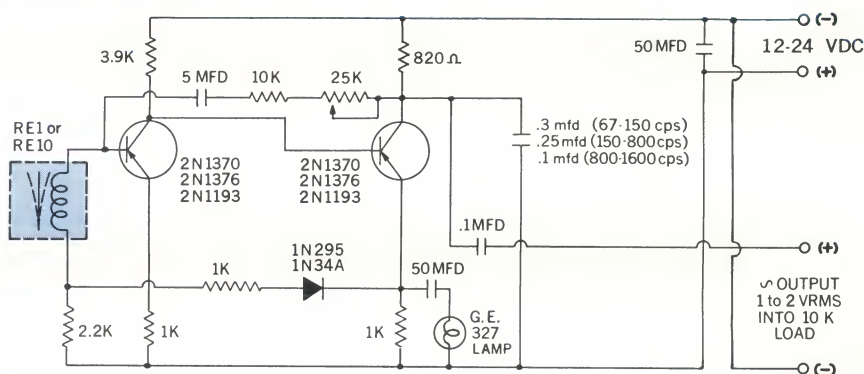
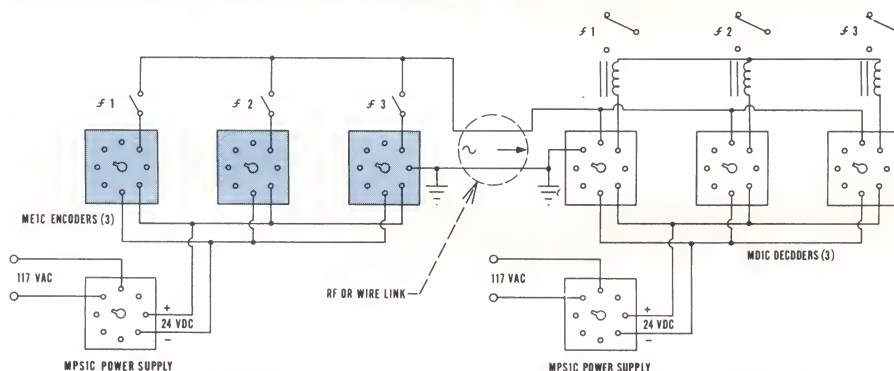


FIG. E. TYPICAL ENCODER-DECODER MODULE WIRING DIAGRAM



specializing in remote controls...

Bramco engineers specialize in remote controls through single and multi-channel frequency sensing encoder/decoder components and modular systems. We welcome the opportunity to share our specialized skills with you. For application assistance, contact the factory or your nearest representative: ►



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SINGLE CHANNEL

Audio Tone Decoding

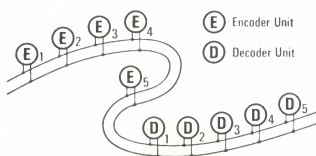
DECODER COMPONENTS
AND SYSTEMS
TO CONTROL,
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BRAMCO CONTROLS DIVISION, LEDEX INC., PIQUA, OHIO

audio tone decoding

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A single pair of wires, or a leased telephone line, can carry the audio signals for a complete control system.



For inaccessible areas or mobile installations, a radio transmitter and receiver system can carry the signals.

Bramco* resonant reed decoders are precision electromechanical devices that are used as frequency selective filters.

Heart of the decoder is an accurately tuned and processed reed which vibrates as a single tine of a tuning fork. The reed, which is biased by a permanent magnet, has normally open relay contacts. When a predetermined AC signal is introduced, the magnetic field fluctuates, causing the reed to vibrate and the contacts to close intermittently. This provides a switching function. If the load is higher than the reed contact rating, an auxiliary circuit can be used.

Bramco decoder reeds are engineered for narrow response bandwidth. This feature, combined with the high accuracy of Bramco encoder reeds, permits over 50 selective control frequencies within the 67 to 1600 cps spectrum.

A big advantage of reeds in control switching is that they are ideally suited for simultaneous and sequential coded tone systems. The actual number of control functions possible in such a system is virtually unlimited. For example, over 3300 individual control functions are possible with only 16 frequencies coded sequentially in groups of three.

Bramco resonant reed decoders, compared to other types of tone filters, are small and inexpensive. They give more control functions per spectrum, per size, per dollar—often pay for themselves by the wire they save.

RD1: The RD1, with a broad frequency spectrum of 300 to 1600 cps, is a universal single channel decoder for any remote control system that must deliver reliable performance under tough operating conditions. A floating type internal shock mount assures high stability under mobile conditions—makes it ideal for two way selective call systems in mobile communications and industrial supervisory controls.

RD10: Comparable to the RD1 in construction and performance, the RD10 extends the frequency spectrum to the lower 67 to 300 cps range. If you're concerned about command signals interfering with normal voice communications, a sub-audible selective call system designed around the RD10's low frequency spectrum provides an ideal solution.

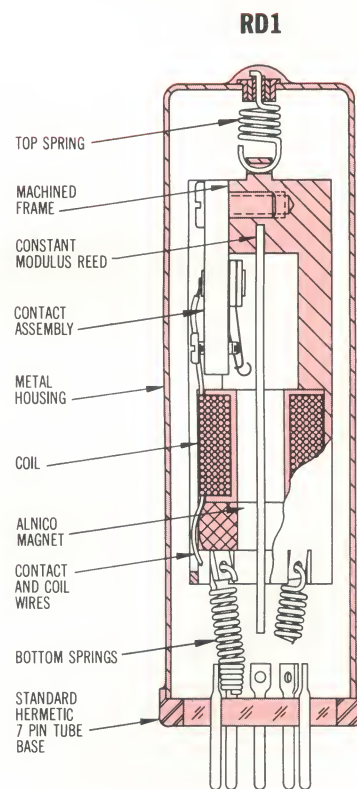
MD1C: To decode, plug it in. Add power. This compact module is ready to perform your complete decoding function. It contains an all-transistorized 3-stage amplifier, a high stability resonant reed relay, and a secondary transistor switching circuit.

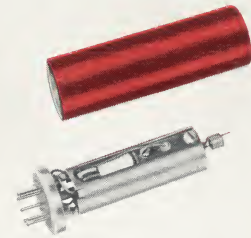
The decoder module is a narrow band audio frequency detector. Its response characteristics are controlled by a frequency sensitive resonant reed relay. When an audio signal of the proper frequency is introduced, the reed resonates at its tuned frequency causing an intermittent contact closure once each cycle. The contact closure triggers the transistor switching circuit which provides a continuous output control function.

The single channel modular concept offers flexibility, allowing the addition of as many frequencies as required for a particular system.

The complete circuitry is mounted on a rugged glass epoxy printed circuit board. The frequency determining resonant reed relay is a plug-in component—making it easy to change the frequency of the module if desired.

Special relays can be supplied to provide varied response characteristics to customer requirements. Companion encoder modules and plug-in power supplies are also available.





RD1

frequency sensing resonant reed relay

standard specifications

| | |
|-------------------------|--|
| frequency range | 300 to 1600 cps |
| frequency stability | varies less than .002% per °C <small>(25°C REF.)</small> |
| temperature range | -40°C to +85°C |
| bandwidth | ±.25% minimum, ±1.5% maximum* |
| operating voltage level | 6 VRMS |
| coil resistance | 600 ohms dc ±10% |
| input impedance | |
| sensitivity | .75 VRMS max., 2.0 VRMS min.* |
| contact duty cycle | 10% min. at resonant freq., 6 VRMS |
| contact rating | 100 ma peak at 12 vdc resistive load |
| power required | |

*SPECIAL RELAYS can be supplied with varying bandwidths and sen

AUDIO TONE CONTROL SYSTEM USING RD1 OR RD10 DECODERS

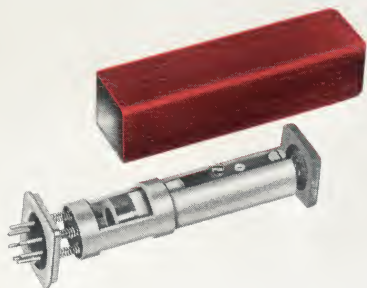
E = encoders, 5 frequencies

T = transmission line: RF carrier
or 2 wire loop

D = decoders, 5 frequencies

F = controlled functions

NOTE: Function 4 illustrates the
use of two simultaneous or se-
quential tones to code a single
function.



RD10 frequency sensing resonant reed relay

67 to 300 cps

varies less than .002% per °C (25°C REF.)

−40°C to +85°C

±1.0% minimum, ±2.0% maximum*

3 VRMS

600 ohms dc ±10%

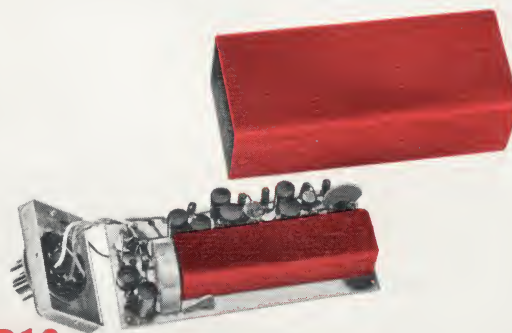
.....

.75 VRMS max., 1.5 VRMS min.*

10% min. at resonant freq., 3 VRMS

100 ma peak at 12 vdc resistive load

.....



MD1C resonant reed decoder module

67 to 1600 cps

varies less than .002% per °C (25°C REF.)

−40°C to +85°C

±.25% minimum, ±2.0% maximum*

0.1 to 5.0 VRMS

.....

10K ohms

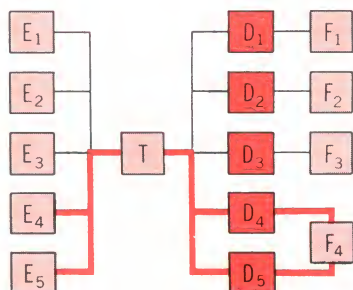
.....

external load: 500 ohms minimum

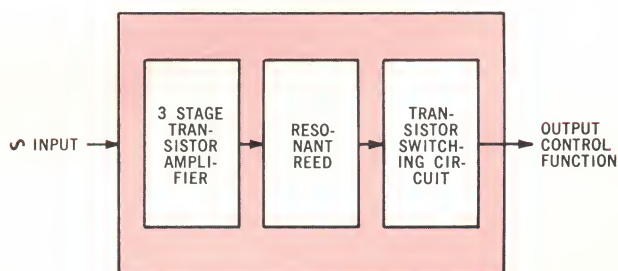
50 ma maximum at 24 vdc

20 ma at 24 vdc + external load

sistivities to meet customer requirements.



MD1C FUNCTIONAL BLOCK DIAGRAM



dimensional data

base diagrams

FIG. A

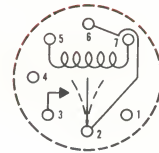
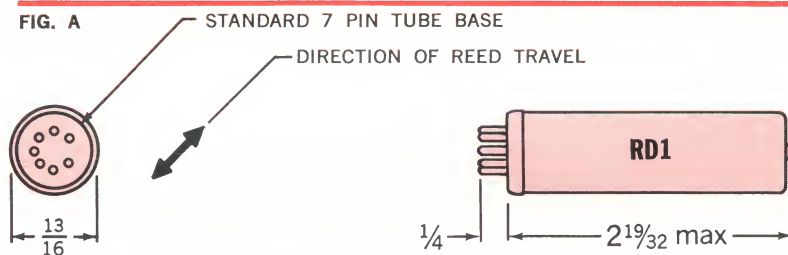


FIG. B

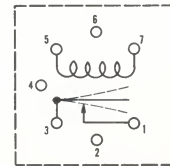
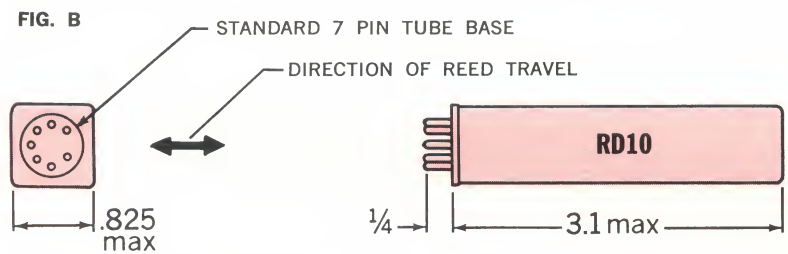
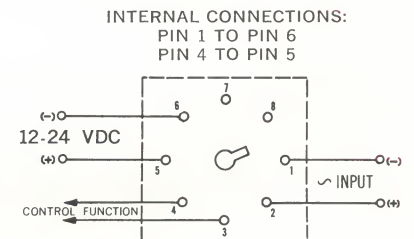
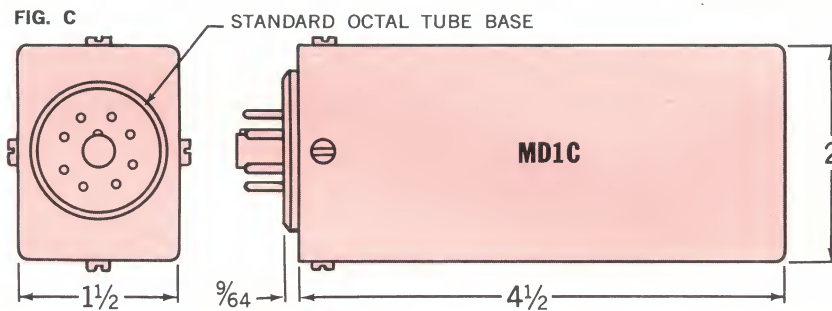


FIG. C



recommended decoder circuitry

The contacts of a resonant reed relay provide an intermittent closure, once each cycle. Continuous closure and heavier switching capacity is obtained by integrating a secondary relay, directly, or through a tube or transistor amplifier. Typical circuits for each method are illustrated in figures D, E, and F.

FIG. D. SECONDARY RELAY

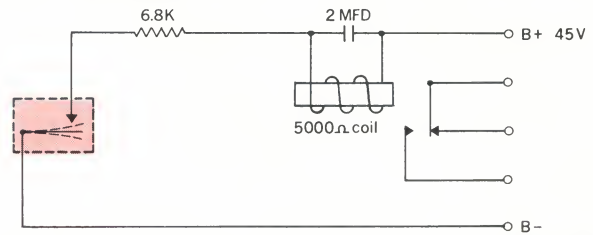


FIG. E. TUBE 6C4

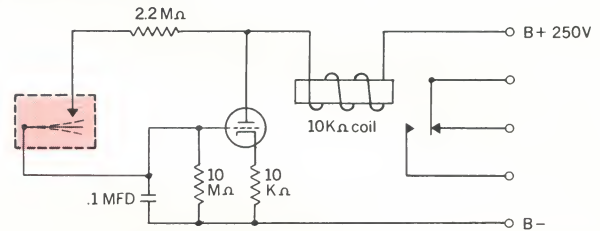


FIG. G. 2-TONE SIMULTANEOUS DECODER CIRCUIT

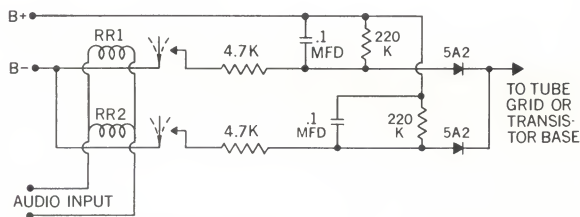


FIG. F. TRANSISTOR AMPLIFIER

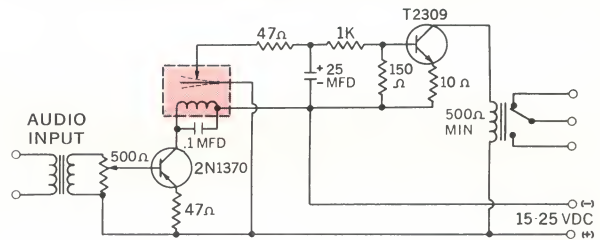
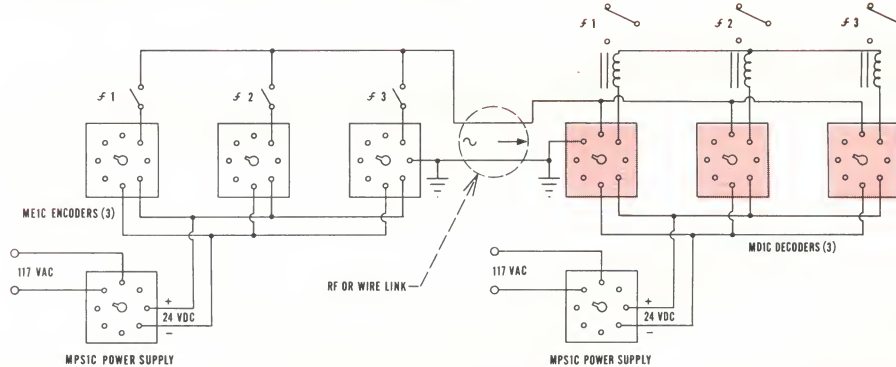


FIG. H. TYPICAL ENCODER-DECODER MODULE WIRING DIAGRAM



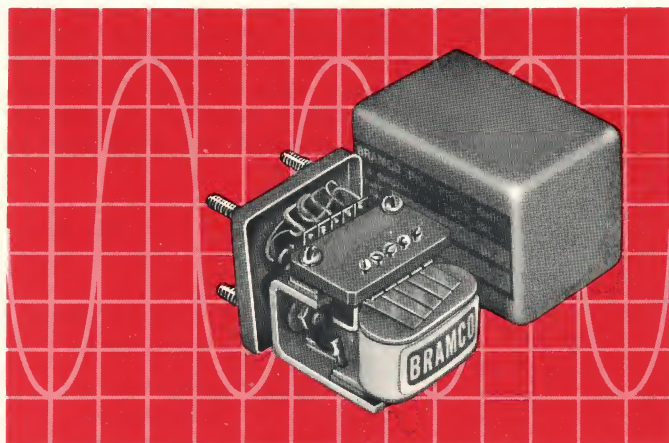
specializing in remote controls...

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RD5S

MULTI-CHANNEL FREQUENCY SENSING RESONANT REED RELAY

HERMETICALLY SEALED — INTERNAL SHOCK MOUNTING — HIGH TEMPERATURE STABILITY

The Bramco RD5S resonant reed relay provides five frequency-selected switching circuits which operate independently or simultaneously, depending upon the audio frequency input to the relay coil.

Heart of the unit is a reed assembly consisting of five precisely-tuned and processed reeds which are free to vibrate as single tines of a tuning fork. The reeds are biased with an alnico permanent magnet. When an AC signal of the same frequency as that of one of the reeds is introduced into the coil, the magnetic field fluctuates and causes that reed to vibrate. When the input signal reaches the specified magnitude, the vibration amplitude of the reed brings it into contact with the pre-set stationary contact once each cycle.

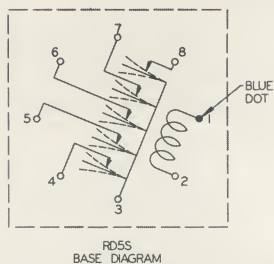
The stationary contact assembly features flexible

solid silver contacts which provide low contact resistance and high duty cycle. This combination offers high switching reliability and allows the use of simpler, more economical secondary circuits.

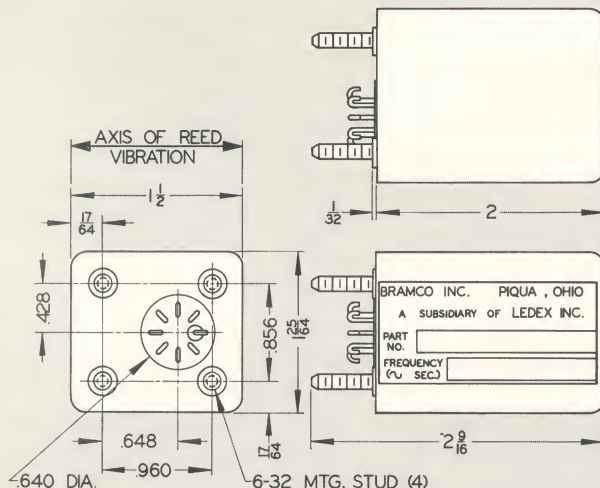
The unit is housed in a metal container with an 8-terminal hermetic seal header. The relay assembly is internally shock-mounted to assure dependable performance under shock and vibration.

Tone signaling systems built around the RD5S can reduce expensive and bulky pulse equipment and multi-conductor control circuits to a simple oscillator with single copper or RF loop.

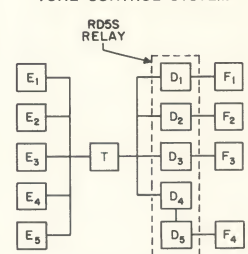
Expansion beyond five basic channels is possible by use of simultaneous or sequential tone codes.



Dimensional data



tone control system



E—ENCODERS 5 FREQUENCIES
T—TRANSMISSION LINE (2 WIRE LOOP OR RF CARRIER)
D—DECODER REEDS 5 FREQUENCIES
F—CONTROL FUNCTIONS
NOTE: FUNCTION 4 ILLUSTRATES THE USE OF 2 SIMULTANEOUS OR SEQUENTIAL TONES TO CODE A SINGLE FUNCTION.

BRAMCO INC., a subsidiary of **Ledex Inc.**

COLLEGE AND SOUTH STREETS, PIQUA, OHIO • TELEPHONE (513) 773-8271

RD5S RESONANT REED RELAY SPECIFICATIONS

NUMBER OF CHANNELS

RD5S is available with 1, 2, 3, 4 or 5 reeds

FREQUENCIES

100 cps to 1000 cps. Standard is 280.8, 313.0, 349.0, 389.0, 433.7 cps. (Exclusive: no limit to frequency separation on individual relays.)

TUNING TOLERANCE

$\pm .3\%$ standard

FREQUENCY STABILITY

Frequency varies less than .002% per $^{\circ}\text{C}$ from -25°C to $+80^{\circ}\text{C}$ (25°C reference)

BANDWIDTH AT OPERATING LEVEL

Minimum $\pm .5\%$. Maximum $\pm 2.5\%$

RESPONSE TIME

50 milliseconds nominal

CONTACT DUTY CYCLE

5% to 30% depending on frequency and operating level

CONTACT RATING

100 ma (peak) at 50 VDC resistive load

SENSITIVITY

Minimum, .4 VRMS. Maximum, .7 VRMS

OPERATING LEVEL

1.5 VRMS

COIL RESISTANCE

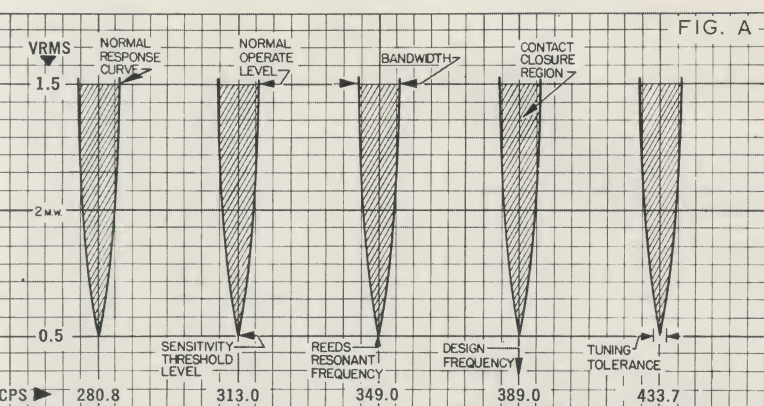
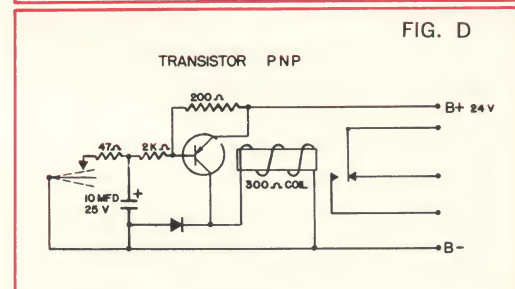
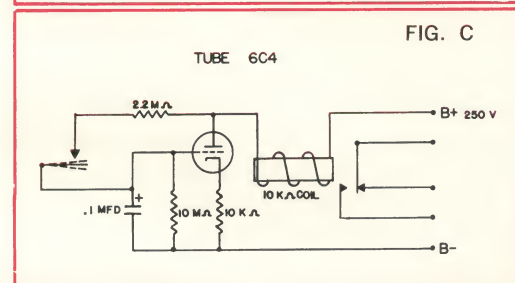
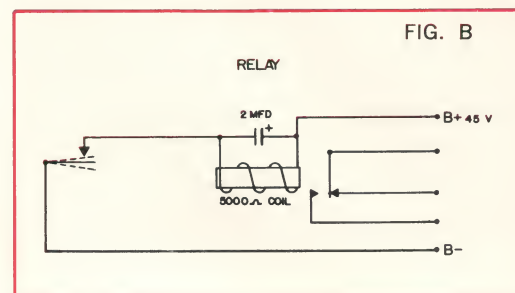
530 ohms, $\pm 10\%$

COIL IMPEDANCE

Approximately 3 times DC resistance at 400 cps.

SPECIAL RELAYS can be supplied with varied coils, bandwidths, sensitivities, and tuning tolerances, to customer requirements.

The contacts of a resonant reed relay provide an intermittent closure, once each cycle. Continuous closure and heavier switching capacity is obtained by integrating a secondary relay, directly, or through a tube or transistor amplifier. Typical circuits for each method are illustrated in figures B, C, and D.



The response curves in Fig. A are merely illustrative, and exact values should not be derived from them. For clarity, different factors are described on each curve. Actually, all factors apply to every curve.

The normal response curve is plotted by varying the input signal frequency and/or power until closure occurs.

Sensitivity (or threshold) is the lowest power level at which closure occurs. Resonant frequency is that frequency at which threshold occurs; it is tuned within the tolerance established at the design frequency.

Bandwidth is the frequency range through which closure occurs. It is specified at the "normal-operate" level.

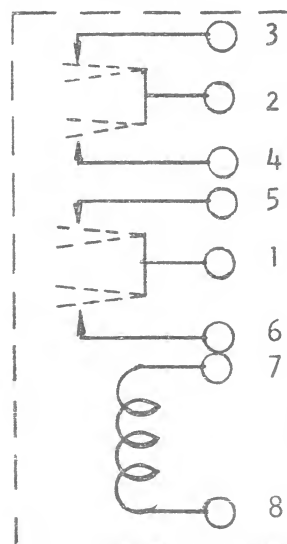
For additional information
contact Bramco Inc. or your
local technical representative

SPECIFICATIONS: (The following apply at 25°C with the relay mounted base down).

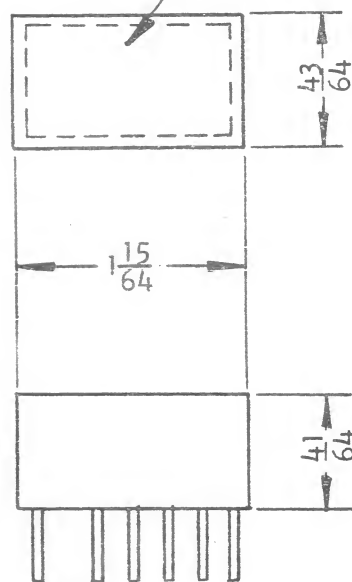
- Design Frequencies: (CPS)**

| PIN 3 | PIN 4 | PIN 5 | PIN 6 |
|-------|-------|-------|-------|
| 313.0 | 349.0 | 389.0 | 433.7 |
- Temperature Stability:** Frequency change will be less than .0025%/°C.
- Coil Resistance:** 1150 ohms DC resistance. +10%.
- Maximum Sensitivity:** There shall be no contact closure below .5 VRMS at any frequency.
- Minimum Sensitivity:** Closure shall occur at 1.5 VRMS max, at design frequency.
- Bandwidth:** ±.5% min. and ±1.5% max. at 4 VRMS drive.
- Contact Duty Cycle:** 10% minimum at resonant frequency and 4 VRMS drive.
- Contact Rating:** 10 ma. peak at 12 VDC into a resistive load.
- Design Range:** 160-600 cps.

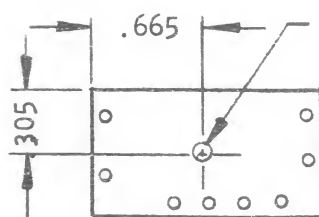
SCHEMATIC



Name Plate

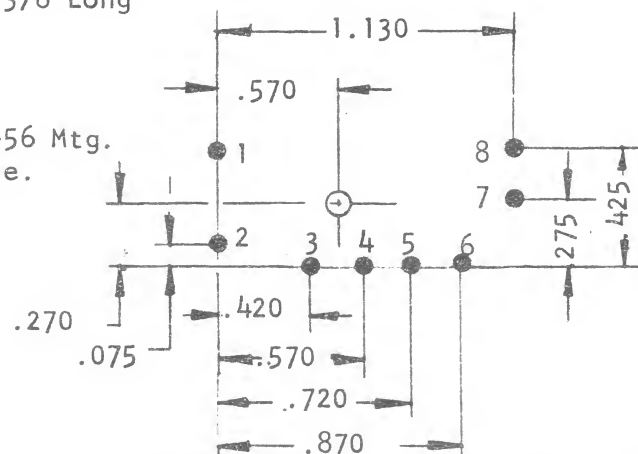


.020 Dia. x 3/8 Long Pins.



#2-56 Mtg. Hole.

Pin Locations



| | | | |
|---------------------------------------|------------------|---------------------------|--------------|
| 4 Redrawn-No change in specs or dims. | | BY | DATE |
| REV. NO. | REVISIONS | | |
| MATERIAL | | DR. <i>Stephen</i> | 2/25/64 |
| FINISH | | CKR. <i>SA-E</i> | |
| SUPERSEDES: | 511A00789- Rev.1 | ENGR. <i>McGee</i> | RELEASE DATE |
| MODEL: | RD-7 | FINAL ASS'Y. (FIRST USED) | |
| NEXT ASS'Y. (FIRST USED) | | | |

BRAMCO CONTROLS DIV.
LEDEX INC.
PIQUA, OHIO

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
LIMITS: FRACTIONS ±1/64
DECIMALS ±.008 ANGLES ±1°

Title:

RESONANT REED RELAY

SHEET
OF 1

NO.

A00789-00001

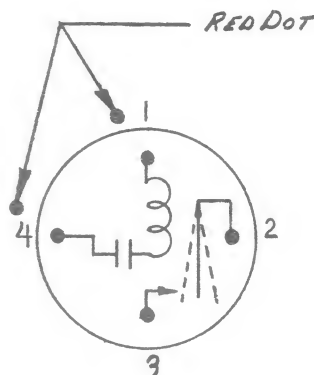
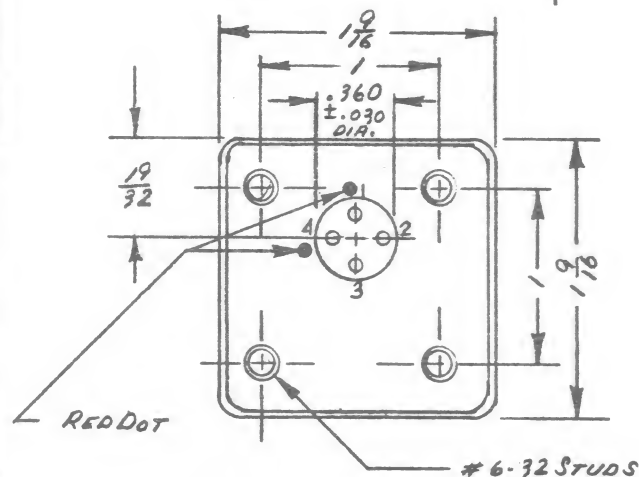
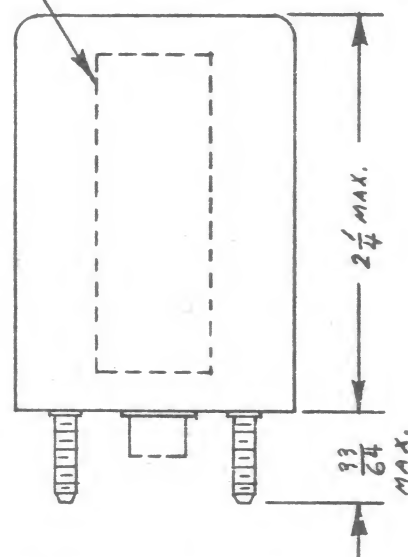
REV.

4

SPECIFICATIONS:

1. Design Frequency: 400 cps.
2. Temperature Stability: Frequency of bandwidth limits will not change more than $\pm 0.002\%$ per degree C. (25°C ref.).
3. Coil Resistance: 600 ohm D.C. $\pm 10\%$ (25°C).
4. Bandwidth: $\pm 4\%$ min. and $\pm 5\%$ max. at 115.0 VRMS drive level.
5. Contact Rating: 100 ma. peak at 50 VDC. (resistive load).
6. Temperature Range: -40°C to $+70^{\circ}\text{C}$.

NAMEPLATE: PIN 1 SIDE
READ FROM RIGHT SIDE



| | | | |
|-------------|--|---------------------------|----------------------|
| 2 | 1104 Redrwn-No chg. in dims. or specs. | 8.2 | 7-10-64 |
| REV. NO. | REVISIONS | BY | DATE |
| MATERIAL | DFT. B. ZATARRIN | DATE | 7-10-64 |
| FINISH | Gray Paint | CKR. | DATE |
| SUPERSEDES: | MODEL: Special | ENGR. M. E. G. L. | RELEASE DATE 7-11-64 |
| | | FINAL ASS'Y. (FIRST USED) | |
| | | NEXT ASS'Y. (FIRST USED) | |

BRAMCO CONTROLS DIV.
LEDEX INC.
PIQUA, OHIO

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
LIMITS: FRACTIONS $\pm 1/64$
DECIMALS $\pm .008$ ANGLES $\pm 1^{\circ}$

Title:

RESONANT REED RELAY

SHEET 1
OF 1

NO.

A01202-00001

REV.

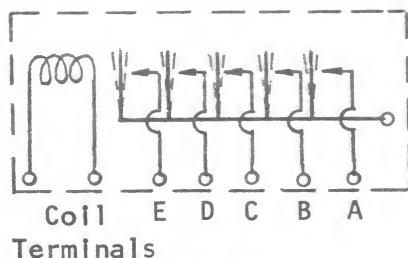
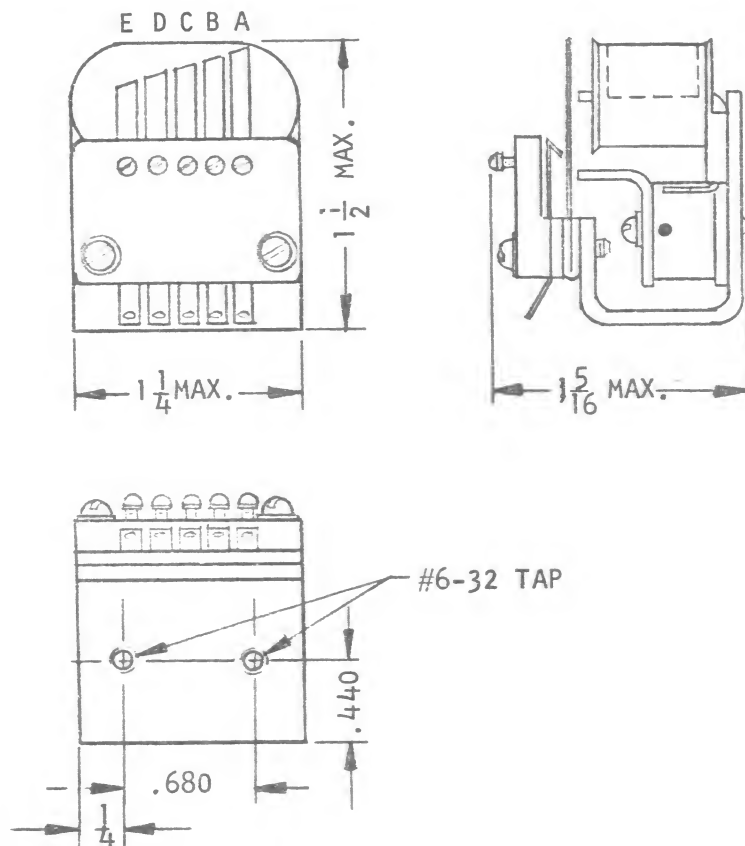
2

SPECIFICATIONS: (at 25°C)

1. Coil Resistance: 3500 ohms $\pm 10\%$.
2. Frequency Stability: Frequency change will not exceed .002%/°C over the range of -40 to +85°C.
3. Maximum Sensitivity: There will be no contact closure below 1.0 VRMS at any frequency.
4. Minimum Sensitivity: There will be contact closure at 2.0 VRMS at design frequency.
5. Bandwidth: $\pm .4\%$ min. and $\pm 1.5\%$ max. at 10.0 VRMS.
6. Contact Current: 100 ma. peak at 50 VDC (Resistive Load, contact + with respect to reeds.)
7. Design Frequency: (CPS)

| REED A | REED B | REED C | REED D | REED E |
|--------|--------|--------|--------|--------|
| 313.0 | 349.0 | 389.0 | 433.7 | 483.5 |

NOTE: Design range 200 - 600 cps.



SCHEMATIC

| | | | | | |
|---------------|-----------|------------------|-------------------------|--------------|------|
| | | | | | |
| 2 | 862 | Redraw, add note | FS 3/6/64 | | |
| REV. NO. | REVISIONS | | | BY | DATE |
| MATERIAL | | | CHKR. | DATE | |
| | | | | | |
| FINISH | | | ENGR. | RELEASE DATE | |
| | | | | | |
| SUPERSEDES: | | | NEXT ASS'Y (FIRST USED) | | |
| A01276 rev. 1 | | | RD-5 | | |

BRAMCO CONTROLS DIV.
LEDEX INC.
PIQUA, OHIO

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
LIMITS: FRACTIONS $\pm 1/64$
DECIMALS $\pm .008$ ANGLES $\pm 1^\circ$

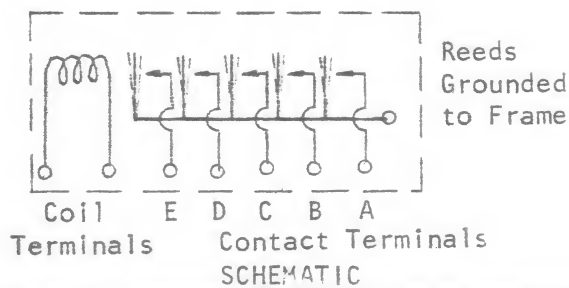
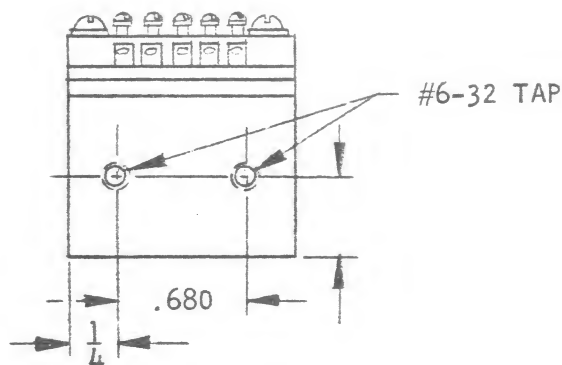
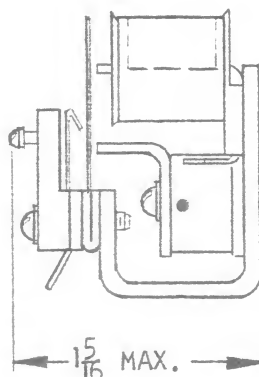
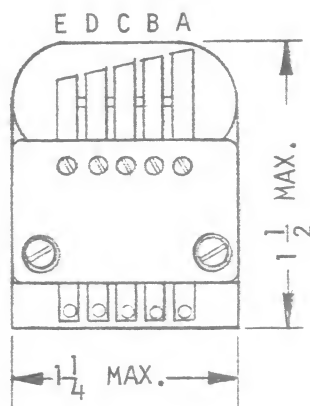
Title:

RESONANT REED RELAY

SHEET
OF 1

NO.
A01276-00001

REV.
2



SPECIFICATIONS: (at 25°C)

1. Coil Resistance: 530 ohms $\pm 10\%$.
2. Frequency Stability: Frequency change less than .002%/°C over the range of -40° to +85°C.
3. Maximum Sensitivity: There will be no contact closure below 1.0 VRMS at any frequency.
4. Minimum Sensitivity: There will be contact closure at 2.0 VRMS at design frequency.
5. Bandwidth: $\pm 0.5\%$ Min. and $\pm 2.0\%$ Max. at 6.0 VRMS.
6. Contact Current: 100 ma. peak at 50 VDC (Resistive Load; contacts + with respect to reeds).
7. Design Frequency: (CPS)

| REED A | REED B | REED C | REED D | REED E |
|--------|--------|--------|--------|--------|
| 313.0 | 349.0 | 389.0 | 433.7 | 483.5 |

NOTE: Design range 200 - 600 cps.

| 1 | 863 Redraw, no change | FS 3/6/61 |
|-----------|------------------------|---------------------------|
| REV. NO. | REVISIONS | BY DATE |
| MATERIAL | PTT. <i>Legg</i> | DATE |
| FINISH | ENGR. <i>W. C. Lee</i> | DATE |
| SUPSEDES: | MODEL: | FINAL ASS'Y. (FIRST USED) |
| A01252- | RD-5 | |

BRAMCO CONTROLS DIV.
LEDEX INC.
PIQUA, OHIO

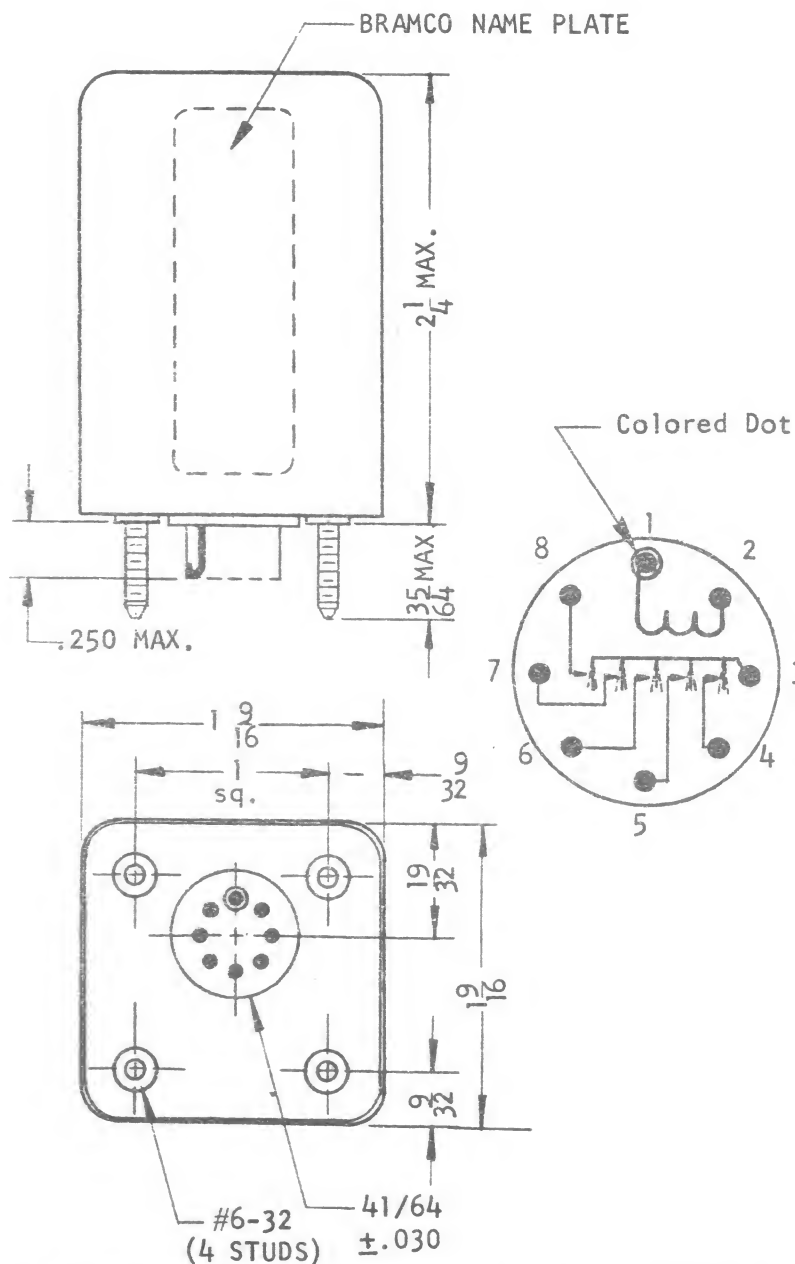
DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
LIMITS: FRACTIONS $\pm 1/64$
DECIMALS $\pm .008$ ANGLES $\pm 1^\circ$

Title:
RESONANT REED RELAY

SHEET
OF 1

NO.
A01284-00001

REV.
1



SPECIFICATIONS: (at 25 degrees C)

1. Coil Resistance: 530 ohms $\pm 10\%$.
2. Frequency Stability: Frequency change less than .002% per Degree C over the range of -40 degrees to +85 Degrees Centigrade.
3. Maximum Sensitivity: There will be no contact closure below 1.0 VRMS at any frequency.
4. Minimum Sensitivity: There will be contact closure at 2.0 VRMS at design frequency.
5. Bandwidth: $\pm 0.5\%$ Min. and $\pm 2.0\%$ Max. at 6.0 VRMS.
6. Contact Current: 100 ma. peak at 50 VDC (Resistive load; pins 4 through 8 positive (+) with respect to pin 3).
7. Design Frequency: (CPS)

| PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 |
|--------|-------|-------|-------|-------|-------|
| COMMON | 313.0 | 349.0 | 389.0 | 433.7 | 483.5 |

NOTE: Design Range 200 - 600 cps.

| | | | | |
|--------------|-----------|--------------|------|-------------------------|
| 1 Add Note | | 860 | F.S. | 3/4 |
| REV. NO. | REVISIONS | | BY | DATE |
| MATERIAL | | DATE | | DATE |
| FINISH | | ENGR. | | RELEASE DATE |
| RED PAINT | | W. J. Jones | | 2-21-64 |
| SUPERSEDES: | | MODEL: | | NEXT ASS'Y (FIRST USED) |
| A01251-00001 | | RD5S | | |
| SHEET 1 OF 1 | | NO. | | REV. |
| | | A01287-00001 | | 1 |

BRAMCO CONTROLS DIV.
LEDEX INC.
PIQUA, OHIO

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
LIMITS: FRACTIONS $\pm 1/64$
DECIMALS $\pm .008$ ANGLES $\pm 1^\circ$

Title:
HERMETICALLY SEALED 5 CHANNEL RESONANT REED RELAY

BRAMCO CONTROLS DIVISION PIQUA, OHIO

PRICES EFFECTIVE 6-1-64

Note: All Prices Based On Standard Coils, Tuning
Tolerances, and Recommended Frequency Ranges

| RD5 DECODER | NUMBER OF REEDS | | | | |
|-------------|-----------------|---------|---------|---------|---------|
| | 1 | 2 | 3 | 4 | 5 |
| 1-9 | \$11.00 | \$12.00 | \$13.50 | \$15.00 | \$17.00 |
| 10-24 | 8.15 | 9.00 | 10.00 | 11.00 | 12.50 |
| 25-99 | 7.25 | 8.05 | 8.95 | 9.85 | 11.25 |
| 100-499 | 5.50 | 6.00 | 6.80 | 7.60 | 8.50 |
| 500-999 | 4.60 | 5.00 | 5.65 | 6.30 | 7.15 |
| 1000-4999 | 3.95 | 4.45 | 5.00 | 5.55 | 6.30 |

| RD5S DECODER | | | | | |
|--------------|-------|-------|-------|-------|-------|
| 1-9 | 21.50 | 22.75 | 24.50 | 26.25 | 28.50 |
| 10-24 | 15.65 | 16.75 | 18.00 | 19.25 | 21.00 |
| 25-99 | 13.90 | 14.90 | 16.00 | 17.10 | 18.75 |
| 100-499 | 10.60 | 11.20 | 12.30 | 13.20 | 14.20 |
| 500-999 | 9.15 | 9.60 | 10.30 | 11.00 | 11.90 |
| 1000-4999 | 7.95 | 8.50 | 9.10 | 9.70 | 10.50 |

| RD7 DECODER | | | | |
|-------------|-------|-------|-------|-------|
| 1-9 | 22.00 | 24.00 | 27.00 | 30.00 |
| 10-24 | 16.30 | 18.00 | 20.00 | 22.00 |
| 25-99 | 14.50 | 16.10 | 17.90 | 19.70 |
| 100-499 | 11.00 | 12.00 | 13.60 | 15.20 |
| 500-999 | 9.20 | 10.00 | 11.30 | 12.60 |
| 1000-4999 | 7.90 | 8.90 | 10.00 | 11.10 |

MORE ►

SINGLE CHANNEL REED COMPONENTS

| QUANTITY | RE1 & RE10 ENCODERS | RD1 & RD10 DECODERS |
|-----------|------------------------|------------------------|
| 1-9 | \$17.50 | \$17.50 |
| 10-24 | 15.00 | 15.00 |
| 25-99 | 12.50 | 12.50 |
| 100-499 | 10.50 | 11.00 |
| 500-999 | 9.00 | 9.50 |
| 1000-4999 | 8.00 | 8.50 |

TONE SIGNALING MODULES

| QUANTITY | ME1C ENCODER | MD1C DECODER | MD5C DECODER | MPS1C POWER SUPPLY |
|----------|-----------------|-----------------|-----------------|-----------------------|
| 1-9 | \$39.00 | \$39.00 | \$55.00 | \$44.00 |
| 10-24 | 36.00 | 36.00 | 49.00 | 40.00 |
| 25-99 | 33.00 | 33.00 | 44.00 | 36.00 |
| 100-499 | 29.50 | 29.50 | 38.00 | 32.00 |



RESONANT REED DEFINITIONS

DATA SHEET 18

Resonant Frequency is the frequency of audio input at which contact closure can be obtained with the least amount of power input.

Natural Frequency is that frequency at which an encoder reed operates.

Design Frequency is the reference frequency from which tuning tolerance and bandwidth are specified.

Frequency Tuning Tolerance is the allowable range within which the resonant (or natural) frequency is tuned.

Frequency Stability is the frequency variation per degree centigrade of temperature change. The change varies inversely to temperature with 25° C. reference.

Bandwidth is the frequency range through which closure occurs at normal operating power level.

Minimum Bandwidth is the frequency range through which contact closure must occur. It is specified at the normal operating power level and referenced to design frequency.

Maximum Bandwidth is the frequency range outside of which contact closure must not occur. It is specified at the normal operate power level and referenced to design frequency.

Threshold Sensitivity is the minimum power level at which contact closure occurs.

Minimum Sensitivity is the power level above which contact closure must occur at design frequency input.

Maximum Sensitivity is the power level below which contact closure must not occur at any frequency input.

Contact Duty Cycle is the percentage of time the contacts are closed per cycle. It is measured at resonant frequency and normal operating power level.

Contact Rating is the maximum peak voltage and current into a resistive load.

Response Time is the elapsed time between application of the signal to the relay coil and the initial contact closure. It is measured at resonant frequency and normal operating power level.



*Response is defined as contact closure obtained by slowly increasing power at fixed frequency settings.



BRAMCO CONTROLS DIVISION, LEDEX INC.

College and South Streets, Piqua, Ohio 45356 • Phone 513-773-8271

STANDARD FREQUENCY CHART

DATA SHEET 19

The frequencies listed below have been established to allow adequate separation and minimum harmonic relationship for use in multiple frequency systems.

| FREQ. C.P.S. | EIA CODE | FREQ. C.P.S. | EIA CODE | FREQ. C.P.S. | EIA CODE | FREQ. C.P.S. | EIA CODE |
|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| 67.0 | L 1 | 192.8 | 7A | 410.8 | 114 | 810.2 | 157 |
| 71.9 | L 2 | 203.5 | M1 | 422.1 | 145 | 832.5 | 127 |
| 77.0 | L 3 | 210.7 | M2 | 433.7 | 115 | 855.2 | 158 |
| 82.5 | L 4 | 218.1 | M3 | 445.7 | 146 | 879.0 | 128 |
| 88.5 | L 4A | 225.7 | M4 | 457.9 | 116 | 903.0 | 159 |
| 94.8 | L 5 | 233.6 | M5 | 470.5 | 147 | 928.1 | 129 |
| 100.0 | 1 | 241.8 | M6 | 483.5 | 117 | 953.7 | 160 |
| 103.5 | 1A | 250.3 | M7 | 496.8 | 148 | 979.9 | 130 |
| 107.2 | 1B | 258.8 | 136 | 510.5 | 118 | 1006.9 | 161 |
| 110.9 | 2 | 266.0 | 106 | 524.6 | 149 | 1049.6 | 131 |
| 114.8 | 2A | 273.3 | 137 | 539.0 | 119 | 1084.0 | P |
| 118.8 | 2B | 280.8 | 107 | 553.9 | 150 | 1120.0 | S11 |
| 123.0 | 3 | 288.5 | 138 | 569.1 | 120 | 1190.0 | S12 |
| 127.3 | 3A | 296.5 | 108 | 582.1 | H | 1220.0 | S2 |
| 131.8 | 3B | 304.7 | 139 | 600.9 | 121 | 1265.0 | S14 |
| 136.5 | 4 | 313.0 | 109 | 617.4 | 152 | 1291.4 | S3 |
| 141.3 | 4A | 321.7 | 140 | 634.5 | 122 | 1320.0 | S15 |
| 146.2 | 4B | 330.5 | 110 | 651.9 | 153 | 1355.0 | S16 |
| 151.4 | 5 | 339.6 | 141 | 669.9 | 123 | 1400.0 | S17 |
| 156.7 | 5A | 349.0 | 111 | 688.3 | 154 | 1430.5 | S7 |
| 162.2 | 5B | 358.6 | 142 | 707.3 | 124 | 1450.0 | S18 |
| 167.9 | 6 | 368.5 | 112 | 726.8 | 155 | 1500.0 | S20 |
| 173.8 | 6A | 378.6 | 143 | 746.8 | 125 | 1520.0 | S9 |
| 179.9 | 6B | 389.0 | 113 | 767.4 | 156 | 1550.0 | S21 |
| 186.2 | 7 | 399.8 | 144 | 788.5 | 126 | 1600.0 | S22 |

| MODEL | RECOMMENDED RANGE | TOTAL RANGE |
|--------------|----------------------|----------------|
| RD 10, RE 10 | 67-300 (39) | 67-1600 (100) |
| RD 1, RE 1 | 300-600 (25) | 300-1600 (61) |
| RD 5 | 200-600 (38) | 100-1000 (77) |
| RD 7 | 150-500 (40) | 150-700 (52) |

Figures in parentheses are the number of standard frequencies possible within the listed range.